

# Algebra 2 - Exponents

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*“Be yourself; everyone else is already taken.” - Oscar Wilde*

Note: It is expected that you try the examples to the best of your understanding, and complete the problem sets by the test date and ask for help where needed.

## 1 Laws of Exponents

Here is a list of the laws of exponents:

$$a^0 = 1.$$

$$a^m \cdot a^n = a^{m+n}$$

$$\frac{a^m}{a^n} = a^{a-n}$$

$$(a^m)^n = a^{mn}$$

$$(a^m b^n)^p = a^{mp} b^{np}$$

$$\left(\frac{a^m}{b^n}\right)^p = \frac{a^{mp}}{b^{np}}$$

$$a^{-m} = \frac{1}{a^m}$$

$$\frac{1}{a^{-m}} = a^m$$

Example: Simplify  $\frac{20x^2y}{8} \cdot \frac{-2x^{-3}y}{x^4y}$ .

Solution:  $\frac{-5y}{2x^5}$

## 2 Solving with Exponents

You can solve equations with unknown exponent values by using the laws of exponents.

Example: Solve for  $x$  in  $(12^x)^5 = 12^{100}$ .

Solution:  $x = 20$

### 3 Rational Exponents

Rational exponents are expressed as  $x^{\frac{a}{b}}$ . This is equivalent to  $\sqrt[b]{x^a}$  or  $(\sqrt[b]{x})^a$ .

Example: Simplify  $\sqrt[3]{27^2}$ .

Solution: 9

### 4 Properties of Radicals

To add or subtract radicals, make sure to simplify the radicals first. If the radicals have the same index and radicand, combine the coefficients and keep the like radicals.

Example: Simplify  $5\sqrt{50} - 2\sqrt{18} + 9\sqrt{32}$ .

Solution:  $55\sqrt{2}$

To multiply radicals, multiply the coefficients and the numbers in the radicand if the index is the same.

Example: Simplify  $(2\sqrt{6} - 4\sqrt{3})(2\sqrt{6} + 4\sqrt{3})$ .

Solution:  $-24$